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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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PILLSBURY WINTHROP, LLP			ALEJANDRO MULERO, LUZ L	
P.O. BOX 10500			ART UNIT	
MCLEAN, VA 22102			PAPER NUMBER	

1763

DATE MAILED: 03/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/815,305

Applicant(s)

HONGO ET AL.

Examiner

Luz L. Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 24 September 2003 and 03 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,4,6-15 and 17-25 is/are pending in the application.
- 4a) Of the above claim(s) 10-13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 4, 6-9, 14-15, 17-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/3/03 has been entered.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Li et al., U.S. Patent 5,772,771.

Li et al. shows the invention as claimed including a plasma processing apparatus comprising: a process chamber 2; an inlet port from which a reactant gas, from gas source 76, is introduced; an annular gas passage 36 connected to the inlet port, the annular gas passage having a plurality of nozzles 34 through which the reactant gas is introduced into the process chamber and is incorporated into a sidewall of the process chamber; a valve 78 disposed between the inlet port and the annular gas passage; a

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first vacuum pump connected to the process chamber so as to evacuate gas from the process chamber; an outlet port 82 provided to the annular gas passage; and a second vacuum pump 84 connected to the outlet port (see figs. 1, 4-5 and col. 3-line 20 to col. 5-line 37).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al., U.S. Patent 5,772,771 in view of Tomoyasu et al., U.S. Patent 5,900,103.

Li et al. is applied as above but does not expressly disclose the claimed dielectric plate and shower plate structure. Tomoyasu et al. discloses an apparatus comprising a gas introducing part comprising a dielectric plate 774 and a shower plate 780a/780b/780c provided on a top of said process chamber so as to introduce the reactant gas from the top of said process chamber, a gas passage 770 being formed between said dielectric plate and said shower plate so that the reactant gas flows through the gas passage and is introduced into said process chamber through said shower plate. Additionally, Tomoyasu et al. also shows wherein the dielectric plate has an inlet port connected to said gas passage so as to supply the reactant gas to said gas passage, and said gas passage has an outlet port to which a gas-evacuating arrangement is connected (see, for example, fig. 37 and its description). Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Li et al. as to further comprise the claimed dielectric plate and shower plate because in such a way the process gases can be uniformly introduced into the processing region.

Claims 14-15, 21 and 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al., U.S. Patent 5,772,771.

Li et al. is applied as above but fails to expressly disclose a gas-evacuating arrangement comprises a bypass passage which connects said outlet port to the first vacuum pump by bypassing said process chamber. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace

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the second vacuum pump of the apparatus of Li et al., with a bypass that connects to the first vacuum pump so as to reduce the overall size and complexity of the apparatus.

With respect to claim 21, Li et al. further discloses a gas injecting part 56 connected to the process chamber so as to inject a discharge gas into the process chamber. Li et al. does not expressly disclose a third vacuum pump connected to the gas injecting part. However, the reference further discloses that by connecting a vacuum pump to a gas passage proper cleaning of the nozzle is ensured (see col. 4, lines 38-59). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to connect a third vacuum pump to the gas injecting part 56 in order to ensure proper cleaning of the nozzle.

Regarding the particular reactant or discharge gasses, these limitations are directed to method limitations rather than apparatus limitations. Since an apparatus is being claimed as the instant invention, the method teachings are not considered to be the matter at hand, since a variety of methods can be done with the apparatus. The method limitations are viewed as intended uses that do not further limit, and therefore do not patentably distinguish the claimed invention. The apparatus of Li et al. is capable of using the claimed reactant and/or discharge gasses.

Claims 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al., U.S. Patent 5,772,771, as applied to claims 14-15, 21 and 24-25 above, and further in view of Tomoyasu et al., U.S. Patent 5,900,103.

Li et al. is applied as above but does not expressly disclose the claimed dielectric plate and shower plate structure. Tomoyasu et al. discloses an apparatus comprising a gas introducing part comprising a dielectric plate 774 and a shower plate 780a/780b/780c provided on a top of said process chamber so as to introduce the reactant gas from the top of said process chamber, a gas passage 770 being formed between said dielectric plate and said shower plate so that the reactant gas flows through the gas passage and is introduced into said process chamber through said shower plate. Additionally, Tomoyasu et al. also shows wherein the dielectric plate has an inlet port connected to said gas passage so as to supply the reactant gas to said gas passage, and said gas passage has an outlet port to which a gas-evacuating arrangement is connected (see, for example, fig. 37 and its description). Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Li et al. as to further comprise the claimed dielectric plate and shower plate because in such a way the process gases can be uniformly introduced into the processing region.

Claims 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al., U.S. Patent 5,772,771, as applied to claims 14-15, 21 and 24-25 above, and further in view of Suzuki et al., U.S. Patent 5,522,934.

Li et al. is applied as above but does not expressly disclose that the gas injecting part comprises a gas inlet port from which the discharge gas is supplied; an annular passage connected to the inlet port and having a plurality of circumferentially arranged

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nozzles through which the discharge gas is introduced into the processing chamber; and an outlet port provided to the annular gas passage so that a third vacuum pump is connected thereto. Suzuki et al. discloses a plasma apparatus that comprises a plurality of gas inlet ports having circumferentially arranged nozzles through which the discharge gas is introduced into the processing chamber in order to uniformly supply the source gases into the process chamber (see, for example, figs. 1-2 and their descriptions). Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Li et al. as to further comprise the claimed gas injection structure in order to uniformly supply the source gas into the process chamber.

Li et al. and Suzuki et al. do not expressly disclose a third vacuum pump connected to the gas injecting part. However, Li et al. further discloses that by connecting a vacuum pump to a gas passage proper cleaning of the nozzles is ensured (see col. 4, lines 38-59). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to connect a third vacuum pump to the gas injecting structure of the apparatus of Li et al. modified by Suzuki et al., in order to ensure proper cleaning of the nozzle.

Claims 1, 4, 6-7, 14-15 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomoyasu et al., U.S. Patent 5,900,103 in view of Li et al., U.S. Patent 5,772,771.



Tomoyasu et al. shows the invention as claimed including a plasma processing apparatus 700 for applying a plasma process to an object to be processed, the plasma process apparatus comprising: a process chamber 710 in which the object to be processed is subjected to the plasma process; an inlet port from which a reactant gas is introduced; a gas passage connected to the inlet port; a first vacuum pump connected to said process chamber through an exhaust line 760 so as to evacuate gas from said process chamber so that said process chamber is maintained at negative pressure; an outlet port 750A connected to said gas passage so as to evacuate the reactant gas from said gas passage (see figs. 35 and 37 and col. 16-line 42 to col. 18-line 25).

Tomoyasu et al. does not expressly disclose an annular gas passage having plurality of nozzles, a valve disposed between the inlet port and the annular gas passage, and a second pump connected to the outlet port. Li et al. discloses a gas introducing structure comprising: a) an inlet port in a sidewall of the chamber connected to an annular gas passage 36, the annular gas passage having a plurality of circumferentially arranged nozzles 34; b) a valve 78 to isolate the chamber from the gas source; and c) an outlet port 82 provided to the gas passage and comprising a vacuum pump 84 to evacuate the reactant gas (see figs. 1, 4-5, and col. 3-line 20 to col. 5-line 37). Therefore, in view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tomoyasu et al. so as to include the gas introducing structure of Li et al. because this will allow for enhanced cleaning of the nozzles. Additionally, it would have been obvious to one having ordinary skill in the art at the time the invention was made that the outlet port of

the apparatus of Tomoyasu et al. would be connected to a vacuum pump in order to exhaust the gas through outlet 750A, because otherwise the gas will be drawn into the process region.

Tomoyasu et al. and Li et al. fail to expressly disclose a gas-evacuating arrangement connected to the outlet port comprising a bypass passage which connects said gas passage to said first vacuum pump by bypassing said process chamber. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the second vacuum pump of the apparatus of Tomoyasu et al. modified by Li et al., with a bypass that connects to the first vacuum pump so as to reduce the overall size and complexity of the apparatus.

With respect to claim 6, Tomoyasu et al. discloses a gas introducing part comprising a dielectric plate 774 and a shower plate 780a provided on a top of said process chamber so as to introduce the reactant gas from the top of said process chamber, a gas passage 770 being formed between said dielectric plate and said shower plate so that the reactant gas flows through the gas passage and is introduced into said process chamber through said shower plate. Additionally, Tomoyasu et al. also shows wherein the dielectric plate has an inlet port connected to said gas passage so as to supply the reactant gas to said gas passage, and said gas passage has an outlet port to which said gas-evacuating arrangement is connected (see fig. 37).

Claims 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tomoyasu et al., U.S. Patent 5,900,103 in view of Li et al., U.S. Patent 5,772,771, as

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applied to claims 1, 4, 6-7, 14-15 and 17-18 above, and further in view of Suzuki et al., U.S. Patent 5,522,934.

Tomoyasu et al. and Li et al. are applied as above but do not expressly disclose that a gas injecting part comprising a gas inlet port from which the discharge gas is supplied and being incorporated into a sidewall of the chamber; an annular passage connected to the inlet port and having a plurality of circumferentially arranged nozzles through which the discharge gas is introduced into the processing chamber; and an outlet port provided to the annular gas passage so that a third vacuum pump is connected thereto. Suzuki et al. discloses a plasma apparatus that comprises a plurality of gas inlet ports having circumferentially arranged nozzles through which the discharge gas is introduced into the processing chamber in order to uniformly supply the source gases into the process chamber (see, for example, figs. 1-2 and their descriptions). Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Tomoyasu et al. modified by Li et al. as to further comprise the claimed gas injection structure in order to uniformly supply the source gas into the process chamber.

Tomoyasu et al., Li et al. and Suzuki et al. do not expressly disclose a third vacuum pump connected to the gas injecting part. However, Li et al. further discloses that by connecting a vacuum pump to a gas passage proper cleaning of the nozzles is ensured (see col. 4, lines 38-59). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to connect a third vacuum

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pump to the gas injecting structure of the apparatus of Tomoyasu et al. modified by Li et al. and Suzuki et al., in order to ensure proper cleaning of the nozzle.

Regarding the particular reactant or discharge gasses, these limitations are directed to method limitations rather than apparatus limitations. Since an apparatus is being claimed as the instant invention, the method teachings are not considered to be the matter at hand, since a variety of methods can be done with the apparatus. The method limitations are viewed as intended uses that do not further limit, and therefore do not patentably distinguish the claimed invention. The apparatus of Tomoyasu et al. modified by Li et al. and Suzuki et al. is capable of using the claimed reactant and/or discharge gasses.

Claims 1, 4, 6-9, 14-15 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tei et al., 2002/0011215 A1 in view of Tomoyasu et al., U.S. Patent 5,900,103 or Li et al., U.S. Patent 5,772,771.

Tei et al. shows the invention substantially as claimed including a plasma processing apparatus for applying a plasma process to an object to be processed, the plasma processing apparatus comprising: a process chamber 101 in which the object to be processed is subjected to the plasma process; a gas introducing part connected to said process chamber so as to introduce a reactant gas into said process chamber and including a dielectric plate 113 and a shower plate 106 provided on a top portion of said process chamber so as to introduce the reactant gas from the top of the process chamber, a gas passage being formed between the shower and dielectric plates so that

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the reactant gas flows through the gas passage and is introduced into said process chamber through said shower plate; and a first vacuum pump connected to said process chamber through an exhaust port 102 so as to evacuate gas from said process chamber so that said process chamber is maintained at a negative pressure (see fig. 1 and paragraphs 0061-0077). Additionally, Tei et al. discloses additional embodiments with a slot antenna having a plurality of slits so as to guide a microwave having a predetermined frequency and where the density of slits is substantially uniform in a radial direction of said slot antenna (see paragraphs 103-108).

Tei et al. fails to expressly disclose an annular gas passage having plurality of nozzles, a valve disposed between the inlet port and the annular gas passage, an outlet port connected to said gas passage so as to evacuate the reactant gas from said gas passage, and a second pump connected to the outlet port. Tomoyasu et al. discloses a gas outlet port 750A (see Fig. 37) connected to a gas-introducing part so as allow the gas to be exhausted from the gas passage. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Tei et al. as to include a gas outlet port connected to a gas-introducing part so as to evacuate the gas from the gas introducing part. It would have been obvious to one having ordinary skill in the art at the time the invention was made that the outlet port of the apparatus of Tomoyasu et al. would be connected to a vacuum pump in order to exhaust the gas through outlet 750A, because otherwise the gas will be drawn into the process region.

Alternatively, Li et al. discloses a gas introducing structure comprising: a) an inlet port in a sidewall of the chamber connected to an annular gas passage 36, the annular gas passage having a plurality of circumferentially arranged nozzles 34; b) a valve 78 to isolate the chamber from the gas source; and c) an outlet port 82 provided to the gas passage and comprising a vacuum pump 84 to evacuate the reactant gas (see figs. 1, 4-5, and col. 3-line 20 to col. 5-line 37). Therefore, in view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tei et al. so as to include the gas introducing structure of Li et al. because this will allow for enhanced cleaning of the nozzles.

Tei et al., Tomoyasu et al. and Li et al., fail to show wherein said gas-evacuating arrangement comprises a bypass passage which connects said outlet port to the first vacuum pump by bypassing said process chamber. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the second vacuum pump of the apparatus of Tei et al. modified by Tomoyasu et al. and Li et al., with a bypass that connects to the first vacuum pump so as to reduce the overall size and complexity of the apparatus.

Claims 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tei et al., 2002/0011215 A1 in view of Tomoyasu et al., U.S. Patent 5,900,103 or Li et al., U.S. Patent 5,772,771, as applied to claims 1, 4, 6-9, 14-15 and 17-20 above, and further in view of Suzuki et al., U.S. Patent 5,522,934.

Tei et al., Tomoyasu et al. and Li et al. are applied as above but do not expressly disclose that a gas injecting part comprising a gas inlet port from which the discharge gas is supplied and being incorporated into a sidewall of the chamber; an annular passage connected to the inlet port and having a plurality of circumferentially arranged nozzles through which the discharge gas is introduced into the processing chamber; and an outlet port provided to the annular gas passage so that a third vacuum pump is connected thereto. Suzuki et al. discloses a plasma apparatus that comprises a plurality of gas inlet ports having circumferentially arranged nozzles through which the discharge gas is introduced into the processing chamber in order to uniformly supply the source gases into the process chamber (see, for example, figs. 1-2 and their descriptions). Therefore, in view of this disclosure, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus of Tei et al. modified by Tomoyasu et al. or Li et al. as to further comprise the claimed gas injection structure in order to uniformly supply the source gas into the process chamber.

Tei et al., Tomoyasu et al., Li et al. and Suzuki et al. do not expressly disclose a third vacuum pump connected to the gas injecting part. However, Li et al. further discloses that by connecting a vacuum pump to a gas passage proper cleaning of the nozzles is ensured (see col. 4, lines 38-59). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to connect a third vacuum pump to the gas injecting structure of the apparatus of Tei et al. modified by

Tomoyasu et al., Li et al. and Suzuki et al., in order to ensure proper cleaning of the nozzle.

Regarding the particular reactant or discharge gasses, these limitations are directed to method limitations rather than apparatus limitations. Since an apparatus is being claimed as the instant invention, the method teachings are not considered to be the matter at hand, since a variety of methods can be done with the apparatus. The method limitations are viewed as intended uses that do not further limit, and therefore do not patentably distinguish the claimed invention. The apparatus of Tei et al. modified by Tomoyasu et al., Li et al. and Suzuki et al. is capable of using the claimed reactant and/or discharge gasses.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1, 4, 6-9, and 14-15, 17-25 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 571-272-1430. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 571-272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Luz L. Alejandro  
Primary Examiner  
Art Unit 1763

February 23, 2004